

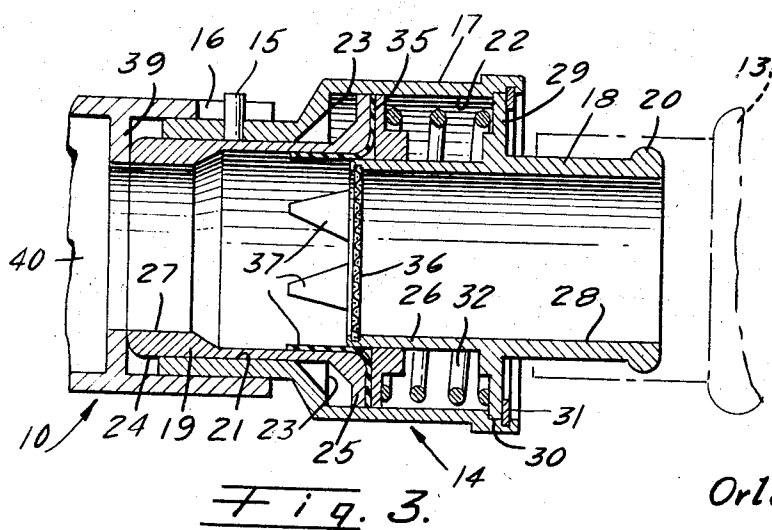
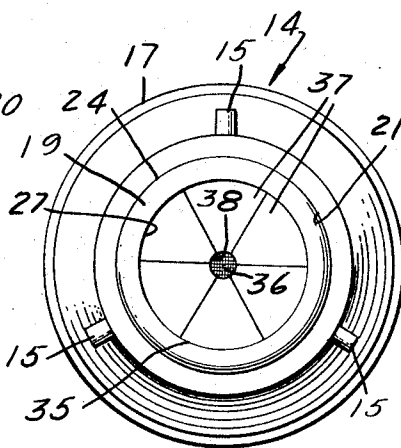
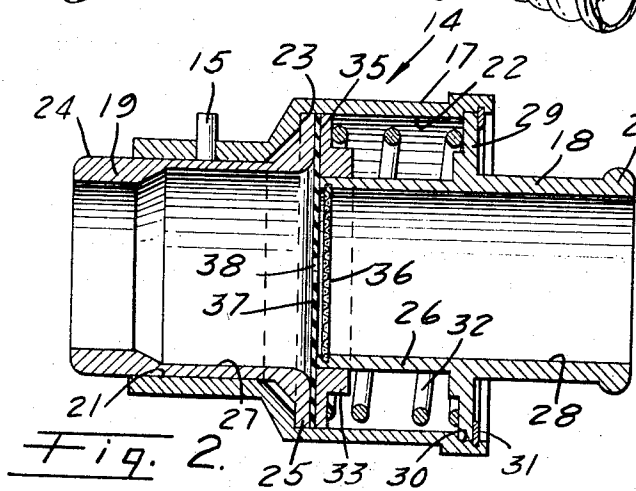
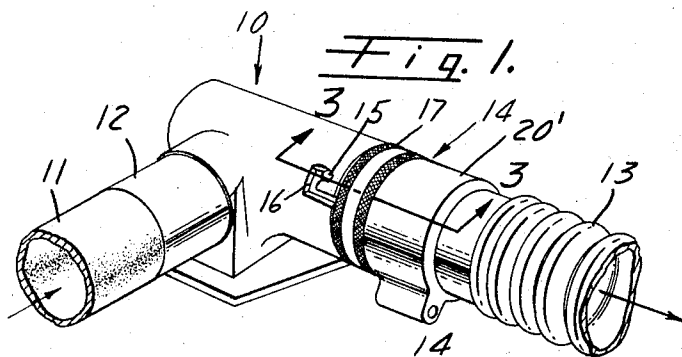
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WARNING DISCONNECTOR-CONNECTOR

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WARNING DISCONNECTOR-CONNECTOR

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The invention relates to breathing apparatus employed on aircraft. The portion of the apparatus to which the application is especially directed is the connector employed at the end of the air hose leading to the mask which in use is connected to a fitting supplied by a central source of supply in the aircraft.

When an airplane is on the ground as crew members assume their stations each man in turn adjusts his individual mask to his face. Sometimes the mask is donned and worn continuously from take-off. On other occasions the mask is merely adjusted and hung at a convenient location so that it can be grasped and donned quickly by the crewman in flight, under those circumstances where cabin pressure normally maintained in the cockpit might be suddenly lost.

In either event it is important that the mask be connected with a source of air or oxygen with which the aircraft is equipped. When at ground level the breathing sensation through the mask is much the same whether the supply hose is attached to the supply system of the aircraft or is disconnected and ambient air at ordinary temperature and pressure is inhaled. This is a condition which is often deceptive because, unless the crewman makes a special point of connecting the hose to the fitting on the aircraft supplied by the central source of supply, this precaution might be overlooked. Subsequently, after the aircraft has gained altitude and the need arises for oxygen the crewman, who may be the pilot of the aircraft could easily lose consciousness without becoming sufficiently aware of the absence of oxygen. The same troublesome circumstance would likewise prevail should the mask not be needed until an emergency condition should arise at high altitude. Then there might be insufficient time to both don the mask and connect the hose to the supply line fitting.

It is therefore, an object of the invention to provide a new and improved device for inclusion in the supply line to a mask which immediately warns the user that the hose is not attached to the supply line fitting.

Another object of the invention is to provide a new and improved harmless warning device which partially impairs the free breathing of the wearer of the mask when it is not properly connected to the supply line fitting, but which at the same time, permits some degree of breathing so that the crewman will not be partially suffocated while the mask is in place.

Still another object of the invention is to provide a new and improved harmless warning device for the supply hose of a breathing mask which by producing discomfort when not properly connected to a source of supply, nevertheless is not so harmful but what the user is capable of breathing without suffocation for a period of time sufficient to remind him to make the proper connection.

Still another object of the invention is to provide a new and improved warning connector-disconnector fitting for the supply hose to a mask which is sufficiently standard and compact with respect to overall dimensions so that it can be readily employed with existing equipment without material or substantial change.

Also included among the objects of the invention is to provide a new and improved harmless warning connector-disconnector apparatus for the breathing system asso-

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ciated with a breathing mask such that an adequate and proper setting can be standardized for all devices and built into the equipment and there be depended upon to work automatically, without need for special adjustment, and which is not adversely influenced by local ambient conditions in the aircraft or on the ground at the time of attachment.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a side perspective view of a supply line fitting showing a supply line attached thereto at one side and a mask hose and its warning disconnect fitting attached thereto at another point.

FIGURE 2 is a longitudinal sectional view of the device in closed position.

FIGURE 3 is a longitudinal sectional view of the device in open condition taken on the line 3-3 of FIGURE 1.

FIGURE 4 is a left end view of the device as shown in FIGURE 2.

In a typical embodiment of the invention which is chosen essentially by way of example of the principles involved in the invention there is shown a stationary supply fitting, indicated generally by the reference character 10, which is normally fastened to some portion of the aircraft structure within the pilot compartment and adjacent to each crew station. The supply fitting 10 is provided on one side with a supply line 11 which leads from a permanent supply of oxygen or compressed air and is provided with some suitable conventional ferrule by means of which it is permanently attached to the supply fitting.

On another side of the supply fitting is a hose 13 which is adapted to be attached to a breathing mask (not shown).

A connection indicated generally by the reference character 14 is permanently attached to the hose 13 and is adapted to be releasably attached to the supply fitting 10 by means of a bayonet joint embodied in bayonet pins 15 on the connection 14 which engage in bayonet slots 16 in the supply fitting.

The supply fitting 10 includes a housing 17, a hose connection sleeve 18, and an actuating sleeve 19. The hose connection sleeve 18 is provided with a bead 20 which is helpful in making an air-tight connection with the hose 13, when held by a clamp 20'.

Within the housing 17 is a chamber comprising a cylindrical portion 21 and an enlargement thereof 22. Between the cylindrical portion 21 and enlargement 22 is an annular shoulder 23. The actuator sleeve 19 includes a cylindrical extension 24 which is slideably contained in the cylindrical portion 21 and a flange 25 which overlies and is adapted to engage the shoulder 23.

The hose connection sleeve 18, in addition to the portion upon which the bead 20 is provided, includes an inner section 26 having an outside diameter slightly less than the inside diameter of a passage 27 in the actuator sleeve 19. A passage 28 in the hose connection sleeve 18 interconnects with the passage 27 in axial alignment and together form a common passage through the connection. A flange 29 on the hose connection sleeve is retained in a recess 30 by means of a snap ring 31. An expansion spring 32 engages at one end under the flange 29 and at the other end is pressed against a spring keeper 33 which slideably encircles the inner section 26.

A resilient diaphragm 35 is secured between the spring keeper 33 and the flange 25 by pressure of the spring 32.

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A relatively stiff screen 36 is anchored at the inner end of the intersection 26 and serves to back up the diaphragm 35 on what is in effect the downstream side of the diaphragm having regard to the flow of gas through the combined passages 27 and 28.

The resilient diaphragm 35 is of special construction and is provided with a series of separate flaps 37 which extend radially inwardly to the edge of a relatively small opening 38 through the center of the diaphragm 35. The opening 38 is many times smaller in diameter than the diameter of the combined passages 27 and 28 so as to cut down appreciably the free flow of gas or air through the passages, but not sufficient to diminish the flow to the extent that a person relying on a supply of gas through the hose 13 might suffocate. Presence of the flaps 37 as a restriction to the flow serves to increase the effort and discomfort of breathing to the extent that the user will be adequately warned that a proper breathing condition does not exist, so that he will thereupon be mindful immediately to make the necessary connection of the connection 14 to the supply fitting 10 to provide himself with adequate gas or air for breathing.

Upon making the necessary connection, the end of the cylindrical extension 24 is pressed against a stop 39 in a passage way 40 of the supply fitting 10. As the bayonet joint is engaged the connection is pressed far enough toward the left, as viewed in FIGURE 3, to move the flange 25 against the spring keeper 33 and pressure of spring 32 while the hose connection sleeve 18 remains stationary. The effect of this is to move the actuator sleeve 19 in a direction from left to right as viewed in FIGURE 3, a distance sufficient to have the wall of the passage 27 extend over the exterior of the intersection 26 of the actuator sleeve 18. When this occurs the end of the intersection 26 presses against the bases of the flaps 37, causing them to be flexed outwardly to the positions shown in FIGURE 3, at the same time moving them away from screen 36, sufficient to entirely clear the combined passages 27 and 28. This is the condition which prevails when a proper connection is made to the supply fitting 10 and hence to the supply line 11. Breathing therefore, becomes completely normal to the wearer of the mask and by this sensation he is immediately advised that the proper connection has been made to the source of supply and that everything is in readiness for operation of the aircraft.

Should, during course of flight, there be any inadvertent disconnection of the connection 14 from the supply fitting 10 the actuator sleeve 19 is thereupon immediately extended by pressure of the spring 32 and the resilient flaps 37 immediately cover the passage way in their positions against the screen 36 causing sufficient restriction to the flow of gas through the combined passages to immediately warn the user that an improper condition exists. This, of course, is accomplished without closing the passages to the extent that might induce suffocation. Again the user is immediately warned to make certain of a proper connection in order to restore normal breathing.

From the foregoing description it will be apparent that the warning is automatic and does not require any accessory adjustment in the system. Also, because of the relationship of the parts shown and described the apparatus is fail-safe and never can be put in condition, however inexpertly handled, to actually cause suffocation to the user. The parts are simple, compact, and because substantially standard can be easily manufactured and assembled and disassembled with equal ease should servicing ever become necessary.

Having described the invention, what is claimed as new and in support of Letters Patent is:

1. In a breathing supply system comprising a supply fitting and a mask hose for attachment thereto, the combination of a connector comprising a housing, a pair of

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sleeves moveable to respective engaged and disengaged positions with respect to each other and mounted in said housing, a diaphragm having a position retained between said sleeves, said diaphragm having a relatively small opening therein and extending across the interior of said sleeves in one relative position of said sleeves providing limited flow through said sleeves, said diaphragm being expandable by action of said sleeves in another relative position thereof whereby to enlarge the size of said opening to permit free flow through said sleeves, and means acting between said fitting and one of said sleeves when the connector is attached to the fitting to move said sleeves to the position which expands the diaphragm.

2. In a breathing supply system comprising a supply fitting and a mask hose for attachment thereto, the combination of a connector comprising a housing, a hose connecting sleeve and an actuating sleeve, said housing having a chamber extending therethrough and a shoulder between opposite ends of said chamber, one of said sleeves being slidably mounted in one end of said housing and having a passage therethrough, a flange on said one sleeve overlying said shoulder and adapted to engage said shoulder, the other of said sleeves having an inner end in sliding engagement with the first sleeve at the end adjacent the flange and a passage therethrough in communication with said first passage, retaining means between said other sleeve and said housing to retain said other sleeve in the chamber, and means acting to separate said sleeves from said sliding engagement, a resilient diaphragm having a relatively small opening providing limited flow through said passages and a plurality of separate flaps located between said opening and the perimeter of said diaphragm, means on said fitting in a position of potential engagement with one of said sleeves adapted when engaged to hold said sleeves in positions of engagement and said flaps in extended positions to clear said passages.

3. In a breathing supply system comprising a supply fitting and a mask hose for attachment thereto, the combination of a connector comprising a housing, a hose connecting sleeve and an actuating sleeve, said housing having a chamber extending therethrough and a shoulder between opposite ends of said chamber, one of said sleeves being slidably mounted in one end of said housing and having a passage therethrough, a flange on said one sleeve overlying said shoulder and adapted to engage said shoulder, the other of said sleeves having an inner end in sliding engagement with said one sleeve at the end adjacent the flange and a passage therethrough, retaining means between said other sleeve and said housing to retain said other sleeve in the chamber, a resilient diaphragm positioned on said shoulder, and an expanding spring in a position holding said diaphragm on said shoulder and acting to separate said sleeves from said sliding engagement, said resilient diaphragm having a relatively small opening providing limited flow through said passages and a plurality of separate flaps located between said opening and the perimeter of said diaphragm, means on said fitting in a position of potential engagement with said one sleeve and interlocking means respectively on the housing and the fitting adapted when engaged to hold said means in engagement with said one sleeve and said sleeves in positions of engagement wherein said flaps are in extended positions to clear said passages.

4. In a breathing supply system comprising a supply fitting and a mask hose for attachment thereto, the combination of a connector comprising a housing, a hose connecting sleeve and an actuating sleeve, said housing having a chamber extending therethrough and a first shoulder between opposite ends of said chamber, said actuator sleeve being slidably mounted in one end of said housing and having a passage therethrough, a flange on said actuating sleeve overlying said first shoulder and adapted to engage said first shoulder with the end of said

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actuating sleeve exposed beyond the housing, said connecting sleeve having an inner end in sliding engagement with the interior of the actuator sleeve at the end adjacent the flange and a passage therethrough in communication with said first passage, a flange on said connector sleeve and a second shoulder in said chamber overlying said last flange to retain said connector sleeve in the chamber, and an expanding spring acting between said flanges in a direction to separate said sleeves from said sliding engagement, a resilient diaphragm positioned on said shoulder and having a relatively small opening providing limited flow through said passages and a plurality of separate radially extending flaps located between said opening and the perimeter of said diaphragm, a screen on said connector sleeve overlying said flaps on the mask hose side thereof, a stop on said fitting in a position of potential engagement with said actuator

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sleeve and interlocking means respectively on the housing and the fitting adapted when engaged to hold said stop in engagement with said actuator sleeve and said sleeves in a position of sliding engagement, said flaps having positions extended by engagement of said sleeves to clear said passages.

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